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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/642,852	08/18/2003	Qinbai Fan	GTI-1542	4043
33058 7590 03/21/2007 MARK E. FEJER GAS TECHNOLOGY INSTITUTE 1700 SOUTH MOUNT PROSPECT ROAD DES PLAINES, IL 60018			EXAMINER CHU, HELEN OK	
			ART UNIT	PAPER NUMBER
			1745	
SHORTENED STATUTORY PERIOD OF RESPONSE		MAIL DATE	DELIVERY MODE	
3 MONTHS		03/21/2007	PAPER	

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

## Office Action Summary

Application No.

10/642,852

Applicant(s)

FAN, QINBAI

Examiner

Helen O. Chu

Art Unit

1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 12 June 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-39 is/are pending in the application.
- 4a) Of the above claim(s) 15-39 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

### **DETAILED ACTION**

1. Applicant's Arguments/Remarks have been received on June 12, 2006. Claims 1, 9-10, 12 have been amended.
2. The text of those sections of Title 35, U.S.C. code not included in this action can be found in the prior Office Action.

### ***Claim Objections***

3. Claim 1 is objected to because of the following informalities: please change "and" to "or" in the second to last line of claim 1. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

4. The rejections under 35 U.S.C 112, first paragraph, on claims 4 and 9 are withdrawn because Applicant has amended the claims.
5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claim 1 is rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for "proton conductive lignin sulfonic acid" or "electron conductive polyaniline grafted to lignin", does not reasonably provide enablement for "proton conductive material and said electron conductive material

Art Unit: 1745

comprising lignin.” The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make the invention commensurate in scope with these claims. The teachings of the specification only disclose a ligno-sulfonic acid or an electron conductive polyaniline grafted to lignin. There are no generic teaching that the lignin can be for any proton conductive material or any electron conductive material.

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

The rejections under 35 U.S.C 112, second paragraph, on claims 4 and 9 are withdrawn because Applicant has amended the claims.

8. Claims 1-14 are rejected as failing to define the invention in the manner required by 35 U.S.C. 112, second paragraph.

The claim(s) are narrative in form and replete with indefinite and functional or operational language. The structure which goes to make up the device must be clearly and positively specified. The structure must be organized and correlated in such a manner as to present a complete operative device. The claim(s) must be in one sentence form only. Note the format of the claims in the patent(s) cited.

9. Claims depending from claims rejected under 35 U.S.C 112, first paragraph and second paragraph are also rejected for the same.

***Claim Rejections - 35 USC § 102***

9. The rejections under 35 U.S.C 102(e) as anticipated by Srinivas on claims 1-14 are withdrawn because the Applicants amended the claims

***Claim Rejections - 35 USC § 103***

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 1-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Srinivas (US Publication 2004/0110051 A1) in view of Tripathy et al. (US Publication 2002/0183470 A1)

In regard to claims 1-11, the Srinivas reference discloses a fuel cell with an anode catalyst layer comprising a proton conductive material made of sulfonic acid (Paragraph 22). The Srinivas reference discloses a grafted sulfonated polyaniline and a polypyrrole ionomer that is electrically conductive and dispersed throughout a carbon support in fuel cell catalysts (Paragraph 41 and Paragraph 30), however, the Srinivas reference does not disclose a material comprising lignin. The Tripathy et al. reference discloses the use of another form of polyaniline, or more specifically, polyaniline-lignin sulfonate complexes (Paragraph 25) which are used as catalyst disposed on electrically charged substrates (Abstract) in lightweight battery (Paragraph 3). The Tripathy reference further disclose these polyaniline-lignin sulfonate complexes are water soluble virtually

Art Unit: 1745

eliminating the need for toxic reagents and solvents, and thus creating an environmentally friendly synthesis (Paragraph 14), therefore it would have been obvious to one of ordinary skill to place catalyst such as polyaniline-lignin sulfonate complexes disclosed by Tripathy into another electrochemical device such as the fuel cell; the fuel cell utilizes a sulfonated polyaniline catalyst layer as disclosed by Srinivas in order to create a light weight electrochemical cell without environmental hazards. It is well known in the art that a PEM fuel cell and battery are electrochemical devices with anodes, cathodes and a proton exchange membrane electrolyte. The PEM fuel cell and battery are therefore functional equivalence. The substitution of known equivalent structures involves only ordinary skill in the art. *In re Fout* 213 USPQ 532 (CCPA 1982); *In re Susi* 169 USPQ 423 (CCPA 1971); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *In re Ruff* 118 USPQ 343 (CCPA 1958).

In regards to claim 12, the Srinivas reference discloses a proton exchange membrane electrolyte with a thickness of 50-175  $\mu\text{m}$  (Paragraph 17).

In regards to claim 13, the Srinivas reference discloses a catalyst layer that comprises platinum from Johnson Matthey (Paragraph 28) with a combination of ruthenium (Paragraph 146) and has a loading 0.15  $\text{mg}/\text{cm}^2$  (Paragraph 163).

In regards to claim 14, the Srinivas reference discloses the sulfonated group per monomer unit on the polymer ranges from 0.2- 2.9 (Paragraph 136).

### ***Response to Arguments***

12. Applicant's arguments with respect to claims 1-14 have been considered but are moot in view of the new ground(s) of rejection.

***Conclusion***

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Helen O. Chu whose telephone number is (571) 272-5162. The examiner can normally be reached on Monday-Friday 8am-4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1745

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

HOC

  
TRACY DOVE  
PRIMARY EXAMINER

3/07